EXISTING OF PERIODIC AND BOUNDED SOLUTIONS OF QUASILINEAR EQUATIONS SECOND ORDER

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In this article considered periodic and bounded solutions of differential equation

$$y'' + ay' + by + c|y' + d \cdot y| + f(t, y, y') = 0, \qquad (1)$$

where a, b, c, d – real numbers, the function $f(t, y, y')$ satisfies condition $\lim_{r\to\infty} \frac{1}{r} \sup\limits_{t,|y|+|y'|\le r} |f(t, y, y')| = 0.$

In the (a, b) plane, we define the sets

$\mathrm{I}(c, d) = \{(a, b):\ ad > 0, 2ab = d(c^2 + a^2)\},$

$\Delta(c, d) = \{(a, b):\ -c \le a \le c, 4c|d| \le 4b \le a^2 + c^2 - 2c|2d - a|\}.$

***Theorem* 1**. *Let* $d \ne 0$, $|b| - c|d| \ne 0$ *and the coefficients a, b satisfy conditions: either* $a/d \notin (0,\ 2)$, *either* $0 < a/d < 2$ *and*

$$\left(2ab - d(c^2 + a^2),\ \frac{c^2 - a^2}{c}\sqrt{\frac{2d}{a} - 1}\right) \ne \left(0,\ \frac{4k\pi}{T}\right),\ k = 1,2,\ldots$$

Let function $f(t, y, z)$ *is* $T-$*periodic. Then equation (1) has at least one* T*-periodic solution.*

***Theorem* 2**. *Let* $d \ne 0$ *and the coefficients a, b satisfy conditions* $|b| - c|d| > 0$ *and* $(a, b) \notin I(c, d) \cup \Delta(c, d)$. *Then equation (1) has at least one solution that is bounded on the whole axis.*

Literature

1. Ahmedov J. T., Mirzoev S. H., Nurov I. J. Analysis of periodic solutions of non-smooth dynamical systems with forced oscillations // Proceedings of TNU. **issue 1-3**, 2016. P. 14-17.